Extension Service Circular 376 January 1942

NUTRITIONAL SCIENCE AND AGRICULTURAL POLICY[1]

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[1] Address before the American Farm Economic Association, New York City, December 30, 1941.

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This year the American Farm Economic Association meets under unusual circumstances. We are in the midst of a great World War which challenges the basic institutions and human values on which our economic system was developed. We have turned over to our military and naval services the responsibility for obtaining victory. We are backing those services with the full resources and economic power developed in this country through an era of a free economic order.

Despite the stark reality of world-wide war, we have the complete confidence that we will win that war in the military and industrial sense. But, as Vice President Wallace has warned us within the past week, defeating Hitler is "only half the battle." Thinking of the future peace, the Vice President said, "is not searching for an escape from the stern realities of the present, not taking refuge in airy castles of our minds. . . . Planning for the future peace must of necessity be a part of our all-out war program."2/

In those words lies a challenge to everyone attending this session. Next to doing everything we can to win the war, farm economists and rural sociologists have an equal responsibility in post-war planning. We must prepare now to have a post-war world in which there will be assured those freedoms that millions of men in our armed services have pledged their lives and honor to defend.

It is significant that there is such widespread interest in nutrition today. Good human nutrition has a real war meaning and purpose. It is a goal, an objective for man and society. In the attainment of any broad human goal like nutrition, conservation, prosperity, or well-being, a whole set of disciplines and sciences comes into play. Therefore nutrition is a broader field than biochemistry, home economics, or preventive medicine. It is rooted in both the biological and social sciences.

Scientific agricultural training and public service in the field of agriculture provide the broadest kind of background for scientific thinking in those fields where biology and society meet. Such training deals with the basic economics of food and fiber production. It offers a working knowledge of biochemistry. It deals with the sociological sciences of how people live and why they do what they do. In these fields we now have much of the knowledge necessary to improve greatly if not assure the third great freedom -- freedom from want throughout the world.

Certain definite, observable changes in modern culture are taking place as a result of scientific knowledge. Those most striking, for instance, are perhaps in such fields as transportation, communication, and sanitation. Science and technology change our culture and thereby the habits of the individual.

One of the great observable changes as a result of science is in the field of human food. We are in a period in which our food habits are

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2/ Wallace, Henry A. Foundations of Peace. Atlantic Monthly, January 1942.

shifting from those based on prescientific folklore and local environment and natural foods to diets based upon scientific nutritional standards.

This cultural change is taking place at a rapid rate. Naturally those working in the various fields of food use and consumption are most aware of it. This is true whether one is engaged in meal preparation for the family, for the public, or in related health and welfare work. Such a cultural change has great implications for agriculture, and agricultural economists should, therefore, keep informed as to the latest developments in the nutrition field.

Most of the students of my generation who took elementary courses in economics found the subject divided into production, exchange, distribution, and consumption. To me production was much more tangible than consumption. I am indebted to Dr. John B. Canning for pointing out to me that Alfred Marshall[3/] in the preface to the Principles of Economics wrote:

"The mecca of the economist lies in economic biology rather than in economic dynamics."

When this was written, the modern science of nutrition did not exist.

"Recourse to the indexed items," comments Dr. Canning, "will disclose that the 'economic biology' Marshall had in mind had nothing to do with the biology of man and the primary economic needs proceeding therefrom."

This economic biology of man which is the mecca of the economist becomes very important when it reaches the point of having a specific scientific basis. It can then set up definite goals of consumption to which the productive resources can be adjusted. If you really accept this with all its implications you set an entirely new course for the ship of agricultural economics and policy.

The nutritional relationship of the biological and economic sciences has a precedent set for it in the field of sanitation. With the wide acceptance of the germ theory of disease and its relationship to health has come a sense of public responsibility for sanitation. We now accept the idea that it is the duty of society to protect its members from infectious disease caused by lack of sanitation. By the same token may we not be at the beginning of an epoch where it becomes the duty of society, as a matter of public health and welfare, to see to it that all its members get a diet that squares with scientific standards?

If the logic of this is accepted, then there will have to be much that is new in the fields of agricultural policies, as they relate to the economics of both production and distribution; and sanitation sets a precedent.

3/ Marshall, Alfred, Principles of Economics, an introductory volume. 871 pp. London, Macmillan, 1920. p. xiv.

NUTRITIONAL SCIENCE AND THE PROGRESS OF MAN

Tremendous progress has been made in the field of biological and nutritional science. From some of the earliest studies in nutrition, made by Lavoisier as early as the eighteenth century[4/] nutrition has now become one of the leading players on the stage called life. It has become a developing pattern in modern civilization.

The three points in the progress of nutritional research that stand out clearly today are:

(1) Mankind has been presented with a rapidly accumulating amount of knowledge that comes from biochemistry and physiology and that points to great possibilities for the future of the human race if intelligently applied. This body of science is growing rapidly.

(2) Human nutrition and nutrition in many mammalian farm animals are closely related. Though there are variations in reaction in different species, knowledge about biochemistry obtained from studies among animals has been of immeasurable benefit in its application to man. Since animal nutrition is one of the basic foundations of scientific agriculture, it is relatively easy for scientifically trained people in our colleges of agriculture to grasp the significance of human nutrition.

(3) Researches have been undertaken which extend into the fields of hormones, enzymes, vitamins, rare minerals, and the complicated biochemical phenomena in the human being. Though much remains to be understood in this complicated field, there is reason to believe that nutrition has a great deal to do with the phenomena of life, longevity, and the general physical, mental, and spiritual well-being of human beings.

What has been the effect of these developments in science on our standards of living and our cultural patterns? Richard Osborn Cummings[5/] answers this question in these words:

"The science of nutrition may be said to have advanced to the point where it is firmly established not only as a branch of preventive medicine but as a major instrument of social policy."

4/ Hawley, Estelle E., and Carden, Grace. The Art and Science of Nutrition; a Textbook on the Theory and Application of Nutrition. 619 pp., illus. St. Louis, The C. V. Mosby Co. 1941.

5/ Cummings, Richard Osborn, The American and His Food. 267 pp. Chicago. The University of Chicago Press, 1940.

A WIDENED SCOPE OF AGRICULTURAL RESEARCH

Agriculturists naturally are impressed by the fact that much of the progress in nutritional research came in the field of animal nutrition. Had it not been for the work in the agricultural experiment stations and in such branches of the Department of Agriculture as the Bureau of Home Economics, the Bureaus of Animal Industry, Plant Industry, Dairy Industry, Chemistry and Engineering, and private organizations and groups that endowed some of the researches in animal nutrition, progress would have been slower. To mention a few names that come to mind, we think of Armsby of Pennsylvania State College, Hart, Steenbock and Elvehjem of Wisconsin, McCollum of Wisconsin and Johns Hopkins, Maynard of Cornell. These and many others have contributed much toward the advancement of nutritional science.

For example, important research work on human nutrition is being carried on by the Public Health Service, the Bureau of Home Economics and other bureaus of the Department of Agriculture, as well as by a number of research laboratories in the various research institutions of this country.

Recently there passed over my desk a summary of the projects being carried on under the Adams, the Purnell, and the Bankhead-Jones Acts, granting moneys to the Office of Experiment Stations and the experiment stations of various States cooperating under these acts. An effort is made under these provisions to avoid duplications and to relate the work being done at one station with different investigations in the same field at other stations. On animal nutrition the report gave approximately 363 active projects. On human nutrition there were 51 active projects. This, of course, is aside from all the other private researches being carried on in the medical schools, hospitals, and similar institutions in the country.

NUTRITION, HEALTH, AND VITALITY

A great advance in human nutrition took place when medical research began to show positively that improper food and malnutrition caused disease, and lack of proper functioning of the human organism. Medical science now attributes certain definite diseases to nutritional deficiencies. It has much basis for inferring that there is a great "subclinical" zone, as it is called, in which the human organism does not exhibit positive disease but in which there is such reduction of the natural muscular and nervous vitality that there is susceptibility to all sorts of disease, lack of vigor, and ill health. Surgeon General Thomas Parran, Jr., of the Public Health Service, has displayed great scientific statesmanship in seeing human nutrition as a most important public health matter. He thinks that we are at about the same place in understanding the health implications of human nutrition today as we were in relation to bacteria half a century ago. More than this, he sees the need for intimate collaboration between agricultural and public health agencies in matters of nutritional policy. The fine cooperative relation between the United States Public Health Service and the United States Department of Agriculture are very significant.

NUTRITIONAL STANDARDS

An important recent development is the establishment of standards for human nutrition approved by leading nutritional scientists and offered to the public as a guide. The first of international significance was the statement on the standards of nutrition agreed upon after consulting experts, by the Technical Commission of the League of Nations Health Committee.[6/] The latest scientific dietary standard requirements given out in this country are those recommended by the Committee on Food and Nutrition of the National Research Council at the time of the National Nutrition Conference held in Washington, D. C., last May.[7/] These standards have been widely publicized in connection with the great amount of nutrition education now being disseminated by Government and private agencies and by the schools, colleges, and health workers in all parts of the country. The setting of these standards marks the point in the development of nutritional science where responsible bodies of scientists have agreed that certain food elements are essential for the proper functioning of the human body. This really means the beginning of a new epoch in consumption, economics, and human welfare. It is something tangible upon which goals can be based.

SOIL, DIET, AND HEALTH

As a result of earlier studies by Beeson[8/] and others, researches have now been started to learn more about the interrelationship between soil, the food grown on different soils, diet, and the chemistry of the animal and human body. This research has begun at Cornell University, the School of Nutrition, with Dr. L. A. Maynard at the head.

Hunger of primitive man was different from the kind of hunger suffered by most people in the present age. Primitive man lived in the open air. Hunger for him meant an empty stomach. But he also lived close to the soil, and in the course of his food-getting more than likely he ate plants and animal tissues and blood through which he received minerals more directly from the soil than does modern man.

Some, like Dr. H. A. Morgan, of the Tennessee Valley Authority, would hold that soil is the starting point of good nutrition. Though the knowledge which the soil people have on this subject to date represents

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6/ Report on the Physiological Bases of Nutrition, Ser. L.o.N.P. 1936. II.B. 4, 27 pages. See also The Relation of Agriculture to Health, Agriculture, and Economic Policy: Final Report of the Mixed Committee of the League of Nations, Ser. L.o.N.P. 1937. II.A.10, 327 pp.

7/ Recommended Dietary Allowances. Committee on Food and Nutrition, National Research Council. 5 pp. May 1941.

8/ The Mineral Composition of Crops With Particular Reference to the Soils in Which They Were Grown. A Review and Compilation, by Kenneth C. Beeson, U. S. Dept. of Agr. Misc. Pub. 369, 164 pp. 1941.

only the extreme cases, evidence has been produced which relates soil deficiencies to the lack of physical and mental vigor of the people living on the soil, or eating food produced on such soil. There are areas in the world where human or animal foods, or both, are inadequate because the soils lack calcium, phosphorus, sulphur, iodine, copper, iron, or cobalt in forms available to plants. In a recent study on the mineral composition of crops with reference to the different soils on which they were grown, as reported in the United States Department of Agriculture Miscellaneous Publication No. 369, the following wide ranges in mineral content were found:

301 samples of alfalfa varied in calcium content from a minimum of 0.59 percent to a maximum of 4.15 which was 7 times the minimum amount; 238 samples of turnip roots showed a variation in phosphorus content of 0.06 percent to 0.79, or 13 times the content of the low sample; 67 samples of cabbage varied in iron content from 11 parts per million to 305 parts per million, more than 27 times as much for the high sample; 30 samples of celery showed a range in copper content from 2 parts per million to 560 per million, which means that one sample of celery had 280 times more copper than that having the least amount; 35 samples of carrots showed a variation in iodine content ranging all the way from 2 parts per million to 2,400 parts per million, the high sample having 1,200 times as much iodine as the low sample.

More is known about the relationship of the soil to the mineral content of food than its relationship to the vitamin content of food. The availability of boron in the soil, for instance, has a pronounced effect on the quantity of vitamin A in plants. Several elements, especially manganese, have a pronounced effect on vitamin C in plants. After more facts of this kind have been made available, it may turn out that the vitamin content of plants is influenced by soil as much as is their mineral content. Soil scientists caution us that it is not a matter of straight-line relationship, but a question of balance between the elements in the soil. It is interesting to observe that medical research leaders who are working on the relationship between vitamins and mineral content to the health and welfare and vigor of the human being also stress the importance of balance between the various vitamins and elements.

This emphasis on balance, both by soil scientists and nutritional and medical men, tells us that while science can improve on nature, it cannot substitute for nature. Even fertile soils, poorly managed, may not provide good foods for those who occupy the land. Variations in the selection of diets, or poor selection of foods that go into the diet, may also definitely influence the nutritional welfare of families living on good land.

In speaking of the possibilities of the new researches at Cornell, E. C. Auchter, Chief of the Bureau of Plant Industry and Administrator of Agricultural Research of the United States Department of Agriculture, says:

"If there were areas in which these elements were deficient, what happens to the human beings who eat those plants, or who eat the animals that fed on those plants? The products of the animals that eat those plants are short on those things we need in our human nutrition and health program. We are making a study of the soil areas in this country. This is a careful study to locate the areas that are deficient in certain elements. The problem then is how to correct the deficiencies -- whether through fertilizer, spraying, irrigation water, or by what means. That problem will be worked out as fast as we can get to it."9/

PLANT BREEDING AND NUTRITION

Because of the importance of vitamins in food, nutritional science extends also into the field of genetics. In researches on plant breeding, evidence is accumulating that some varieties of vegetables are much higher in vitamin content than others and that even within the same variety wide variations exist.

For example, seven varieties of strawberries grown at the North Carolina Experiment Station, under identical conditions, showed variations in ascorbic acid (Vitamin C) ranging from 36.2 milligrams per 100 grams in the case of one of the older varieties to as high as 64.8 milligrams in the case of newly introduced hybrids. Variations from sample to sample within a variety were also evident.

Among 30 varieties and strains of cabbage grown under similar conditions in the gardens at Ohio State University, the ascorbic acid content ranged from 43 milligrams for Allhead Select to 181 milligrams for Midseason Market.

Similar findings are resulting from tests for other vitamins. Take the Chili pepper -- an excellent source of vitamin A. For many peoples in our Southwestern States and Mexico "Chili" is probably the chief source of A. Recently the New Mexico station tested three varieties in the green stage of maturity. A variety known as No. 9 was found to contain 810 micrograms of carotene, whereas the Anaheim variety showed only 520, and a small paprika type only 350.

At the Washington Experiment Station, values in vitamin A in fresh peas were found a range from 600 international units per 100 grams for Telephone variety to 1,600 units for Dwarf Alderman. None of the processes in freezing these peas appeared to alter their vitamin A content.10/

9/ Auchter, E. C. Research in the Nutritional Values of Fruits and Vegetables. An address delivered before the National Defense Gardening Conference, Washington, D. C. December 20, 1941.

10/ Home Resources for Defense. Reprint from Report on the Agricultural Experiment Stations. U. S. Dept. Agr. 1940.

Researches of Dr. L. H. Newman, Agronomist of the Canadian Department of Agriculture, Dr. C. H. Bailey, of the Minnesota Experiment Station, the Division of Cereal Crops and Diseases of the Bureau of Plant Industry, United States Department of Agriculture, and research laboratories of milling companies are showing that there is great variability in the B complex of wheat. To what extent this is genetic or environmental is not known. But, in terms of nutritional value, we are beginning to see that there is a lot of difference in wheat.

These and numerous other experiments that might be mentioned are somewhat preliminary, it is true. They illustrate, however, that there is variability: and they point to the time when we shall know more of the reasons for this variability and the genetic and other factors that influence it. The genetic side of the nutritional quality of food is just emerging.

It is too early to see just what effect nutritional science will have on soil technology and fertilizer practices, on plant and animal breeding, and on animal feeding. I suspect that we may look forward to some important changes in farm practices coming from this source in a decade or so.

FOOD TECHNOLOGY AND FARMING

An important line of research which may have a definite bearing on the future of our agriculture is going on in the field of food technology. There is coming into prominence a kind of profession that might well be called food engineering. It recognizes the importance of vitamins, minerals, and the protective qualities of foods. Growth in this field indicates increasing recognition by food processors that, in order to retain the nutritional quality provided in food by nature, steps must be taken by the processor to retain the highest degree of nutritional quality in the food that goes to the consumer. This offers the possibility of important new foods becoming available for human nutrition, particularly soybean flour, peanut flour, dried skim milk, long extraction flour, and the like.

Agricultural scientists may also have to find ways to grade food in the market place on the basis of nutritional quality. In this they will need the wholehearted cooperation of agricultural economists and marketing officials as well. The problem includes prevention of deterioration in fresh vegetables. Changes in the vitamin content of vegetables between the time they are harvested and the time they are eaten may have a pronounced effect on their nutritional value. Consideration of this point may profoundly affect the future of distribution and marketing.

Time does not permit a discussion, on this occasion, of the bread problem and the recommendations for the enrichment of bread made by the National Research Council.

There is no doubt as to the evidence that the diets of many people are deficient in the B complex. The enrichment of white bread, as recommended by the National Research Council, is necessary as a war dietary measure.

Some have suggested that nutritional research points toward the enrichment of a large number of foods - particularly those of low vitamin and mineral content - with synthetic vitamins and minerals as a possibility in the future. Nutritional scientists are rather skeptical as to this. With the exception of white bread and perhaps a few other foods, they now recommend getting the vitamins and minerals in the natural foods. As a matter of general principle they believe vitamins as medicine should be administered by doctors, and foods should not be used as conveyors of medicine.

FOOD HABITS

This paper, so far, has dealt largely with the biological side of nutrition where a number of biological disciplines are involved and in which developments are taking place at a rapid rate. Let us now turn to the social sciences.

Up to the present, food habits and patterns of food consumption have received little or no attention from the sociologists, and some from the home economists. Dr. Hazel Stiebeling's Studies are perhaps the most representative so far. A check-up on the social surveys by rural sociologists in rural communities shows but little on food habits. Although there are some excellent studies of standards of living, there has been but little on the food ways of people and on the why's and wherefore's of food preferences and habits. This is of great importance.

For example, a study in an eastern city disclosed a large number of low-income families that did not avail themselves of milk when it was offered free. Why? Because they or their children did not like milk.

Fifty percent of farm families in a prosperous rural Ohio township, in a good dairy section, were below standard in milk consumption by the children. Why? Because it was not in the habit structure of the family.

Dr. Richard O. Cummings, in his book, The American and His Food, and Dr. J. C. Drummond of the University of London, now a member of the British Food Ministry, in his book, The Englishman's Food[11/] have presented the cultural historical side in an interesting manner. Studies in this field by students of culture such as rural sociologists, cultural anthropologists, social psychologists, and home economists are very important.

11/ Drummond, J. C., and Wilbraham, Ann. The Englishman's Food, 574 pp., illus. London and Toronto, Jonathan Cape, Ltd. 1939.

DIETARY LEVELS, PLANNING, AND AGRICULTURAL PROGRAMS

One of the major developments in the field of agricultural policy making, in which nutritional science played a leading part, was the establishment of agricultural production goals in connection with the farm programs, commencing in 1936, and especially those under the food-for-freedom goals, established for 1942.

In 1934, Dr. Hazel Stiebeling of the Bureau of Home Economics of the Department of Agriculture worked out recommendations for four diets at different levels of nutritive content and cost. She applied the science of nutrition in such a way as to relate it to income, and worked out a low-cost diet, two moderate-cost diets, and a liberal diet. These were suggested as yardsticks against which actual diets could be measured. This study deservedly attracted a great deal of attention. It was a study of great significance.

The method introduced by Dr. Stiebeling marks a milepost in the history of nutrition. She translated calories, grams, and units of vitamin measurement into so much milk, eggs, meat, vegetables, and other foods which people had to have to be adequately fed. She bridged the gap of uncertainty between production and consumption. Here was a new device for the agricultural economist to take hold of.

In 1935 E. R. Tolley and F. F. Elliott, in the Program Planning Division of the Agricultural Adjustment Administration, organized a planning study which was carried on cooperatively with all land-grant colleges, State extension services and experiment stations, and some of the departmental agencies. They endeavored to interpret the dietary requirements worked out by Dr. Stiebeling in terms of crop acreages and number of livestock as national goals and in terms of regional adjustment in agricultural production. The work indicated that the growing of crops that would give our 130,000,000 people adequate diets would require some significant shifts in agricultural production. Specifically, major increases in the production of leafy, green, and yellow vegetables and in dairy production were indicated.

At the same time, Secretary Wallace, Tolley, and others in the Department were interested in revising the acreage control or adjustment programs in such a way as to encourage conservation. The shifts in production needed from the dietary standpoint worked in very well with the conservation objective, and further emphasized the advantages of shifting away from the surplus crops toward a better balanced agriculture. This work and this line of thought have continued in the planning and development of the farm programs administered by the Department. The work is centered in the underlying philosophy of the Mount Weather agreement in relation to State and local agricultural planning. We are still a long way from achieving the volume and distribution of the protective foods necessary to give all our people the nutritionally ideal diet. But the planning and administrative staff of the Department and Land Grant Colleges are keenly aware of the needs in this field, and they are among the major reasons for, or forces behind, Secretary Wickard's current production-goals or food-for-freedom program.

Meanwhile, the work which Stiebeling and Tolley started is being continued in their respective fields. Dr. Stiebeling and her associates are working out a series of new diets based upon information derived from the study of consumers' purchases and the nutritional standards recently released by the National Research Council. At the same time, the suggested diets are being worked out in terms of acreages and numbers of livestock in the Bureau of Agricultural Economics. The Bureau, and other interested agencies in the Department, are also engaged in a general study, under the leadership of R. C. Smith and F. V. Waugh, of ways in which such surplus disposal and distribution programs as the stamp plan, the school-lunch program, and other approaches might be used to assure a better-fed Nation and increase the demand for the agricultural commodities which we use for food.

The Stamp Plan which, in its initial stages was so ably administered and successfully put under way by Milo Perkins, and the School Lunch Program in which the Surplus Marketing Administration, the Works Progress Administration, and the Extension Service cooperate, are representative of the ultimate stage of the Ever-Normal Granary plan envisioned by Vice President Wallace when he was Secretary of Agriculture. Here practical application of the Ever-Normal Granary to the field of mass consumption and public welfare is made possible.

It is interesting to note that there has been a shift - or perhaps something new - in public opinion in the attitude of people toward the kind of program like the Stamp Plan and the School Lunch Program. There is a widespread acceptance of the idea that low-income people should be well fed as a health measure - at public expense if necessary. A recent reliable survey of opinion on this subject discloses that 70 percent of city people favor plans for subsidization of food purchases such as that embodied in the stamp plan; 10 percent are undecided; only 20 percent are opposed. Among farm people, 82 percent approved.

CONSERVATION AND AGRICULTURAL POLICY

The planning and formulation of agricultural programs under the dietary needs and agricultural adjustment principle of conservation means conservation in the broadest sense. Here we think of conservation not merely as preventing erosion. We apply the yardstick of what food is needed for people to be well fed. We apply the yardstick of what crops will best yield the food to accomplish this and what soils will best raise these crops. To use these yardsticks with accuracy we need standards. Nutritional science now provides us with these standards and offers the starting point from which agricultural planning can be conducted on a truly scientific basis.

A wise conservation policy, such as that underlying the principles embodied in the planning of crops on the basis of dietary needs represents a great cultural change taking place, in that dietary standards are based on science; and agricultural production standards are based more and more on what adequate dietary standards require. It represents an advance along the lines of rational consumer demand instead of letting price adjust production.

If the trend just described is as positive as it appears to be at the present time, it will have a tremendous effect upon agricultural policy. It therefore behooves agricultural economists to have a working knowledge of the outlines of nutrition and of this newer food phenomenon. Science gives the agricultural economists a much more definite starting point on which to base production and consumption policies than we have ever had before.

NUTRITION AND WAR

Nutritional science now has a front rank in the war policies of all nations. Aside from its application in our Army and Navy, nutrition has been recognized in this country as one of the major war activities. All war activities of governmental agencies having to do with nutrition have been placed under the Office of Defense Health and Welfare Services with Mr. Paul V. McNutt, Administrator of the Federal Security, in charge, In the States this work is under the State nutrition committees, which keep in close liaison with the Office of Defense Health and Welfare Services. County nutrition committees have been set up as part of the State and county councils of Defense.

This integration of the war efforts of all agencies dealing with nutrition is an important step. While the administrative status of the various agencies is not affected, their nutritional war efforts are being dovetailed closely for maximum effectiveness. Thus we have, for instance, the cooperation of 9,000 professionally trained extension workers and the 700,000 responsible farm men and women who, as volunteers, stand behind the extension organization in the different States and communities. 10,000 Smith-Hughes high schools in vocational agriculture and home economics are taking part in the nutrition program. So is the 4-H Club organization of 1,500,000 boys and girls. So also are such great organizations as the American Red Cross, members of the medical and dental associations, hospital dietitians, public health and welfare workers.

In this second World War we have a changed food emphasis from that witnessed in the first World War. In 1917 and 1918 the emphasis was on conservation and substitution of food needed for war purposes. In this war the emphasis is on the strength and stamina that come to a people when all of them have the proper food. The great coordinated educational effort of the Nutrition Program, made on behalf of Defense and Victory, should go a long way toward having people recognize the principles of scientific nutrition. It offers a real opportunity in the application of the recommendations made at the National Nutrition Conference held in Washington last May. If these recommendations will be carried through in the stress of the war period ahead, we may foresee permanent dietary shifts in the direction of the protective foods.

THE INTERNATIONAL ASPECTS OF PLANNING PRODUCTION TO MEET NUTRITION NEEDS

It is conceivable to plan agricultural production along the lines suggested so long as we stay within national boundaries.

As soon as we attempt to apply it on an international basis, however, this matter becomes very complicated. No one has attempted to do on a world basis what the program planning people, both State and Federal, did under H. R. Tolley's leadership in 1935 and again in connection with the 1942 goals. Though this was talked about at two meetings of the International Conference of Agricultural Economists,[12/] no concrete plans for action or research have so far been made. The Health Section of the League of Nations, and the International Institute of Agriculture at Rome, were both interested in the problem and might have been working on it now had not the war intervened. Something in an international way may develop among the nations of the Western Hemisphere.

Yet it appears that with the end of achieving international stability after the war and of working out a more permanent peace, the welfare of the people concerned, especially their welfare from the standpoint of nutrition and having enough of the right food to eat, should become the basis of any peace resulting from the present conflict.

The practical question naturally arises: If we were able to apply the nutritional standards recommended by the League of Nations, and the more recently recommended standards of the National Research Council made public at the time of the National Nutrition Conference, how could we use this knowledge to bring about a more humane world and perhaps permanent peace?

As man learns to understand himself better, we may hope that he will be able to apply this new science to himself, and to regulate science so as to benefit mankind. Nutritional science is providing a way whereby reality can be substituted for mythology and superstition. As far as the human being is concerned, much can be done to give him better health, greater happiness, and longevity. As we learn to know more about the nutritional needs of man we ought also to be able to find out ways of giving him a better environment in the other aspects of life.

NUTRITION AND LASTING PEACE

Not long ago Sir John Orr of Scotland spoke to a group of workers in the Department of Agriculture and Public Health Service. Sir John is a leading man of agricultural and nutritional science in Britain. He pointed to the great progress in nutrition in the British Isles prior to

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12/ Proceedings of the International Conference of Agricultural Economists, Fourth Conference 1936. 528 pp. London, Oxford University Press.

the war. He said that in the past 20 years the British have really made remarkable contributions in increasing the stature and health of a large percentage of the children in industrial areas through greater use of milk and the protective foods. It is to maintain insofar as possible what has been accomplished in this respect that Britain has appealed to us for the high-protein products -- eggs, milk, cheese, and meat.

Despite the many accomplishments in the nutritional field in Britain, Sir John stated that universal post-war application of the American food standards, as announced by the National Research Council at the time of the President's Nutrition Conference, would mean a revolution in British farming practices. It was Sir John's hope that in the post-war world nations would formulate their food policies on the basis of human needs rather than on the basis of tariff walls or narrow geographic boundaries. Such policies, he said, would make for a more prosperous agriculture and for greater health and happiness of all people.

Sir John is not alone in these beliefs. Perhaps the more practical world will say that he is too much of an idealist. But ideals are what we need if we want to attain the lasting peace which all mankind craves today. Sir John's ideas should at least be given some serious consideration in the post-war planning in which agricultural economists will be engaged in the months and years that lie ahead.

LOOKING AHEAD

In summary and conclusion it may be in order to indulge in a little speculation, a little prophesy, and a little philosophy.

Adequate human nutrition in scientific terms is in process of becoming a definite goal or objective in society. It is now more definite and objective than many other elements in human welfare. In order that we may work toward this goal, there must be a close relationship between the biological and social sciences, particularly in agriculture. A number of disciplines need to have close working relationship with each other.

In this connection Cornell University has set a new pattern. Mr. E. E. Babcock, chairman of the Board of Trustees of Cornell University, is to no small degree responsible for the organization of the new school of nutrition. The school is to have a 5-year course and tie together physiology, biochemistry, soil, plant, and animal nutrition, home economics as it relates to food preparation, agricultural economics in the field of production and marketing. The last year is to be given by the School of Medicine, supplemented by applied dietetics and hospital work in New York City. Such schools and like activities will have a great influence -- through the processes of college and extension teaching and research -- in changing the attitudes of the American people in relation to food and its influence on health and well-being.

There is a prospect that one of the social effects of the war will be to focus attention on the requirements of a good diet. Agricultural economists and agricultural policy makers should be studying the

impact of widespread acceptance of nutritional science in agriculture, in the same manner that they have studied other trends such as mechanization, international trade, and the like. This new approach requires a lot of new thinking.

How can we keep the food supply adjusted to patterns of consumption based on scientific nutritional standards? Where are the large supplies of milk and dairy products to come from in the future? How is the price mechanism to operate so as to give the flow of the right kinds of foods in the proportion demanded? A central question of the future is: Should the Government subsidize the production of the protective foods so that the price will stimulate their consumption? England has embarked on this policy, and milk is on the way to becoming a free food to all growing children, particularly in the low-income group.

We need much in the way of regional and type-of-farming studies in relation to nutrition which do in a regional way what Dr. Stiebeling has done in a national way. As a basis for planning we need to know by type of city and by region what the food habits are, what the present diets are, and how best the situation can be improved.

Food will play an important role in the new peace. What can be done now to apply on a hemispheric and world basis the principles that we are discussing on a national basis? In the field of distribution and merchandising there must be change and adjustment. New ways must be found to adjust the source of supply to the income levels of different groups.

It is hoped that the workers in the field of agriculture, both in the natural and social sciences, can and will keep at the forefront of these developments.

We need somehow in our land-grant college courses a basic course that might be called an integrated science of man, a course that will bring together the outstanding threads of the various sciences relating to man, so that the student will get an integrated view in terms of current science of just what kind of creature man is. What does genetics say about him? What about man biochemically? What is the nature of him as an organism? What is known about his mental and nervous processes? What is the nature of his culture? How has his culture evolved over the hundreds of thousands of years that man has been man? A few institutions are experimenting with such courses. They are very important for the future. As science gives an integrated picture of the nature of man, we can if we so will, adjust man's environment so as to give him better opportunities to realize himself.

It looks as though we are emerging on an enterprise of adjusting man's food environment along the lines of what science says it should be. If we succeed in this it should be easier to adjust man's environment in other ways as well.

One of the hopes of man in this dismal world is to be found in appraising the social values of science in a philosophical form of scientific humanism by which we can interpret and direct man's struggle into higher values and to a Christian culture. By taking what he knows in biological and physiological science, and by adjusting his cultural environment to the somewhat rigid rules of these sciences, man may eventually hope to make more out of himself and his progeny than he has done so far.

DISTRIBUTION. - A copy of this circular has been sent to each extension director; State leader in county agricultural, home demonstration, and 4-H Club work; extension economist; extension editor; agricultural-college library and experiment-station library.